

NRC Publications Archive Archives des publications du CNRC

A Modeling Approach to the Effect of Resin Characteristics on Parison Formation in Extrusion Blow Molding

Yousefi, Azizeh-Mitra; den Doelder, Jaap; Rainville, Marc-André; Koppi, Kurt A.

NRC Publications Archive Record / Notice des Archives des publications du CNRC :
<https://nrc-publications.canada.ca/eng/view/object/?id=6fccb3bf-1efb-4feb-beb9-57b120562e47>
<https://publications-cnrc.canada.ca/fra/voir/objet/?id=6fccb3bf-1efb-4feb-beb9-57b120562e47>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at
<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site
<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

Questions? Contact the NRC Publications Archive team at
PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

Vous avez des questions? Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.

A Modeling Approach to the Effect of Resin Characteristics on Parison Formation in Extrusion Blow Molding

Azizeh-Mitra Yousefi¹, Jaap den Doelder², Marc-André Rainville¹, and Kurt A. Koppi³

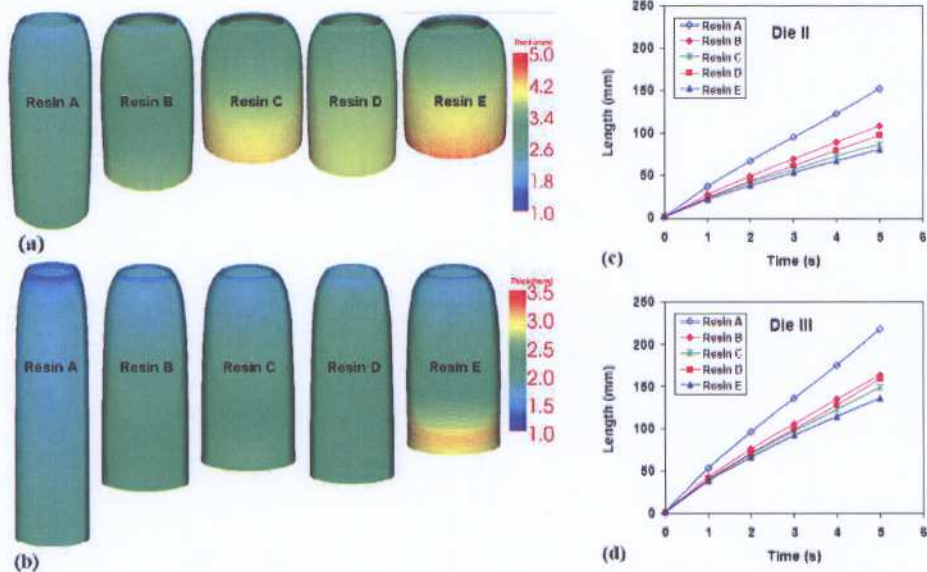
1) Industrial Materials Institute, National Research Council of Canada, Boucherville, Quebec, J4B 6Y4, Canada

2) Dow Benelux B.V., Polyethylene Product Research, P.O. Box 48, 4530 AA, Terneuzen, The Netherlands

3) The Dow Chemical Company, 433 Building, Midland, Michigan 48667, USA

ABSTRACT

The most critical stage in the extrusion blow molding process is the parison formation, as the dimensions of the blow-molded part are directly related to the parison dimensions. The swelling due to stress relaxation and sagging due to gravity are strongly influenced by the resin characteristics, die geometry, and operating conditions. These factors significantly affect the parison dimensions. This could lead to a considerable amount of time and cost through trial and error experiments to get the desired parison dimensions based upon variations in the resin characteristics, die geometry, and operating conditions. The availability of a modeling technique ensures a more accurate prediction of the entire blow molding process, as the proper prediction of the parison formation is the input for the remaining process phases. This study considers both the simulated and the experimental effects of various high density polyethylene (HDPE) resin grades on parison dimensions. The resins were tested using three different sets of die geometries and operating conditions. The target parison length was achieved by adjusting the extrusion time for a preset die gap opening. The finite element software BlowParison[®] was used to predict the parison formation, taking into account the swell and sag. Good agreements were found between the predicted parison dimensions and the experimental data.



(a & b) Simulated parison swell for the five resins after 5 s of extrusion using two different die geometries; (c & d) predicted parison length evolutions as function of time using these dies (gap = 1 mm, flow rate = 10 g/s).